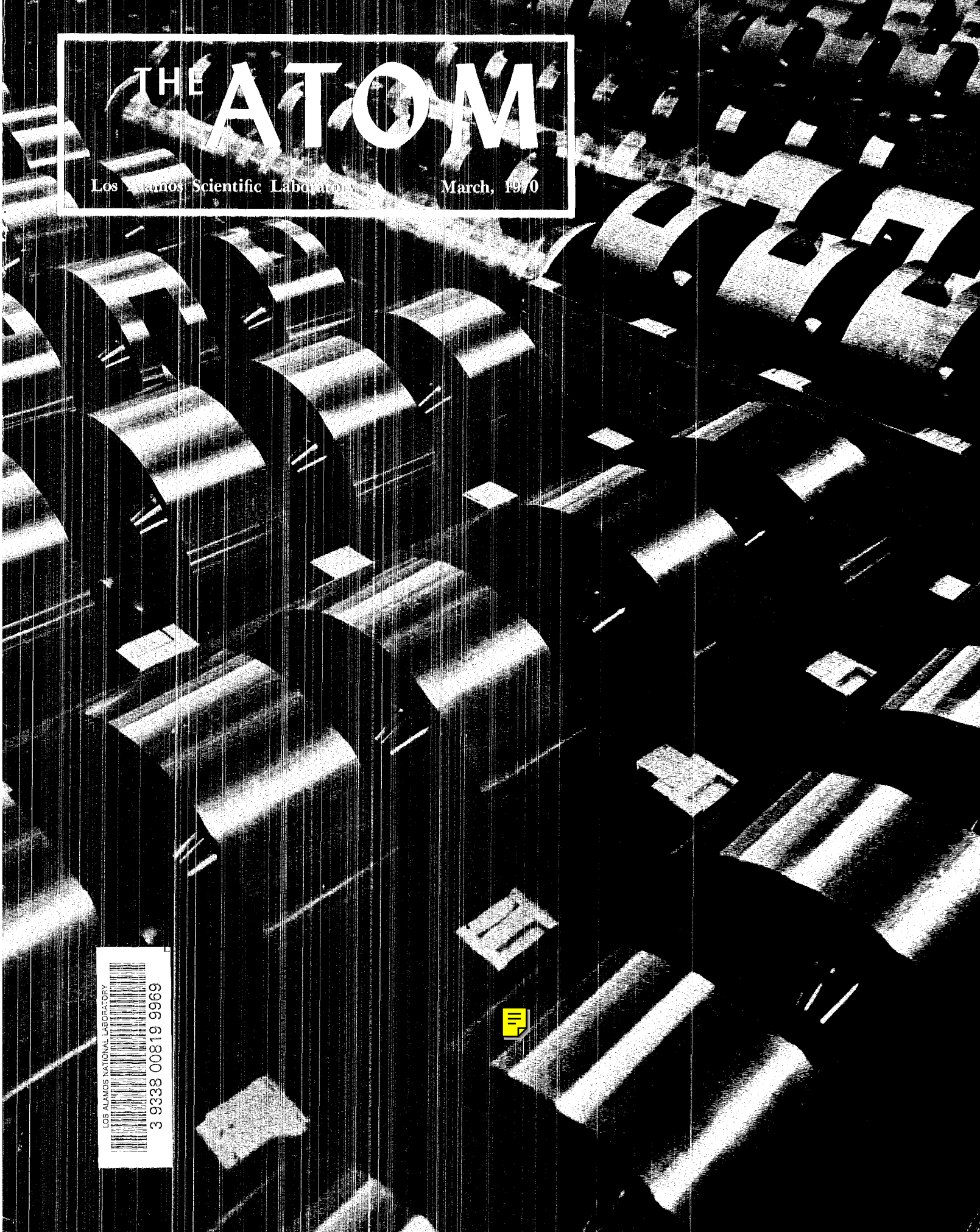
THE ATOM

Los Alamos Scientific Laboratory

March, 1970



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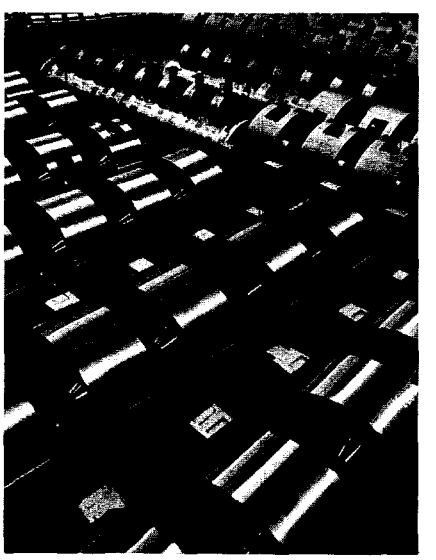

COVER:
A portion of the copper forgings and tank sections that will make up the side-coupled cavity portion of the LAMPF accelerator decorates this month's cover. An associated story, "Another Look at LAMPF," begins on page nine.

The Commuters

By Ken Johnson

An average of more than 2,000 vehicles snake their way up the east face of the "Hill" on State Road 4 each workday. Aside from those carrying goods and services to Los Alamos, shoppers returning from a trip to the valley, and an increasing number of tourists, they are largely the vehicles of commuters who work for the Los Alamos Scientific Laboratory, Zia Company, or someplace else in the community.

Of those who commute, a major portion of them are employed by the Laboratory. But, how many? An approximate and qualified number often used by the Laboratory is 1,000. This figure is drawn from a total of about 4,500 full-time, part-time, and casual employees, and those hired by the Laboratory under its Equal Employment Opportunity Program.

In round numbers, 80 per cent of the total number of employees live on the Hill in either Los Alamos, Barranca Mesa, White Rock, La Vista or Pajarito Acres. The remaining 20 per cent commute to work

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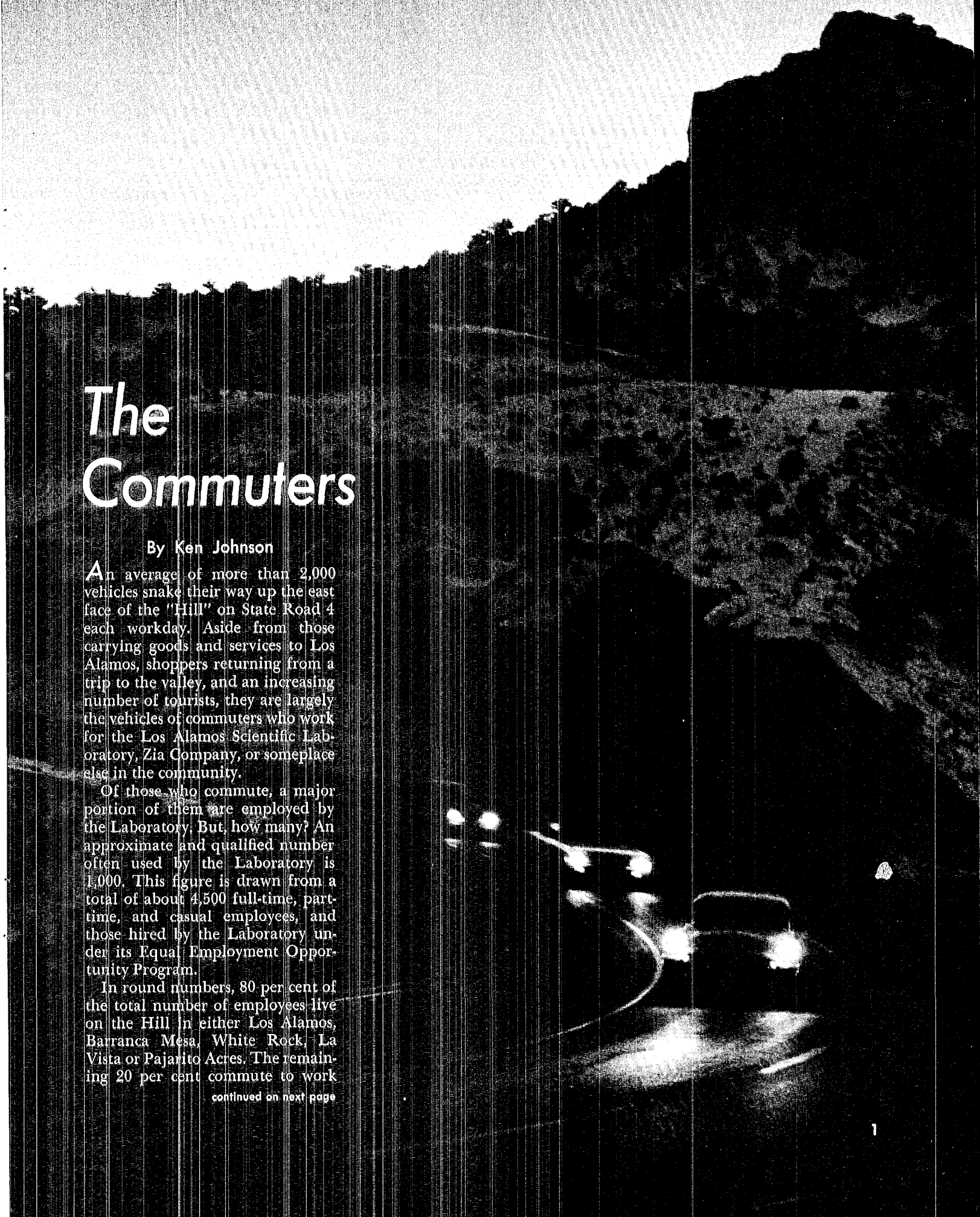
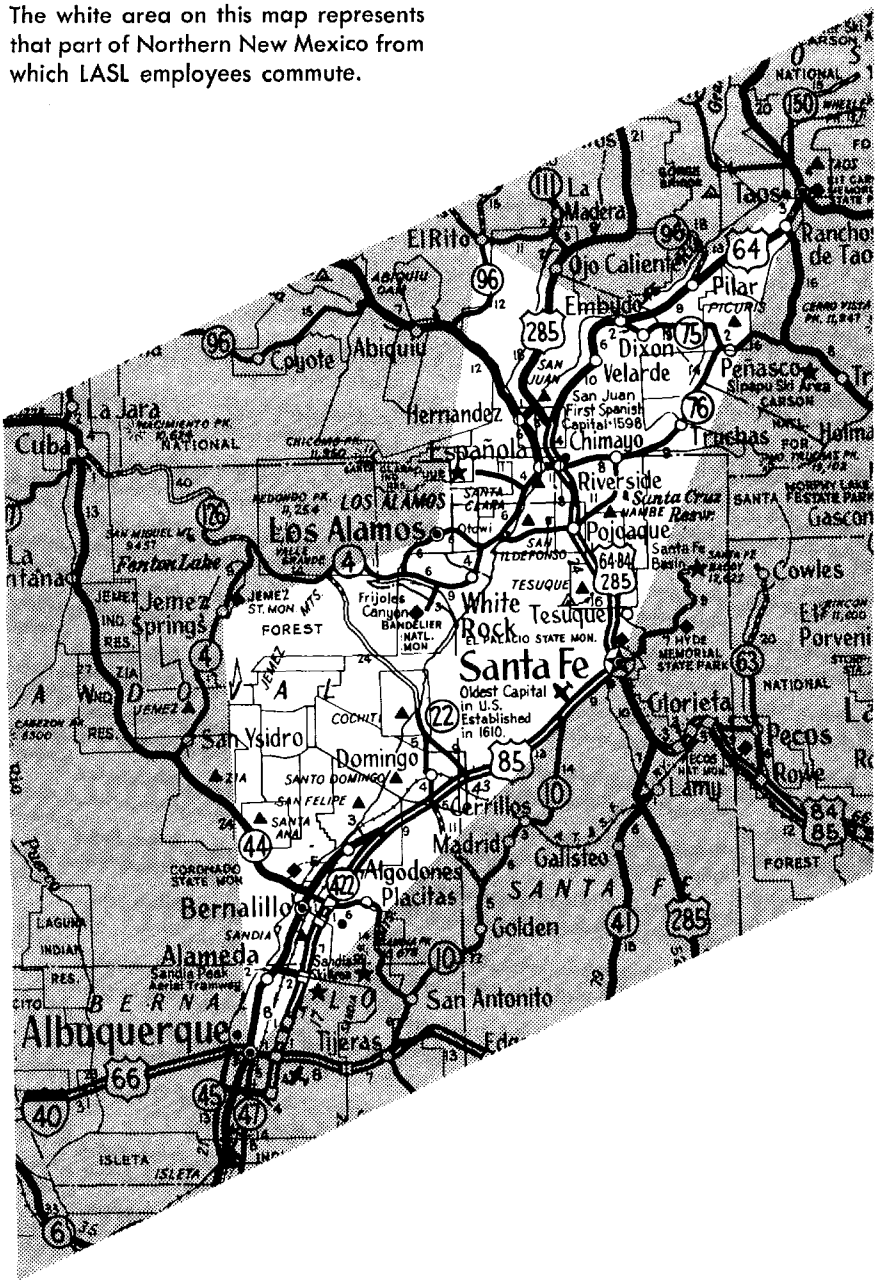
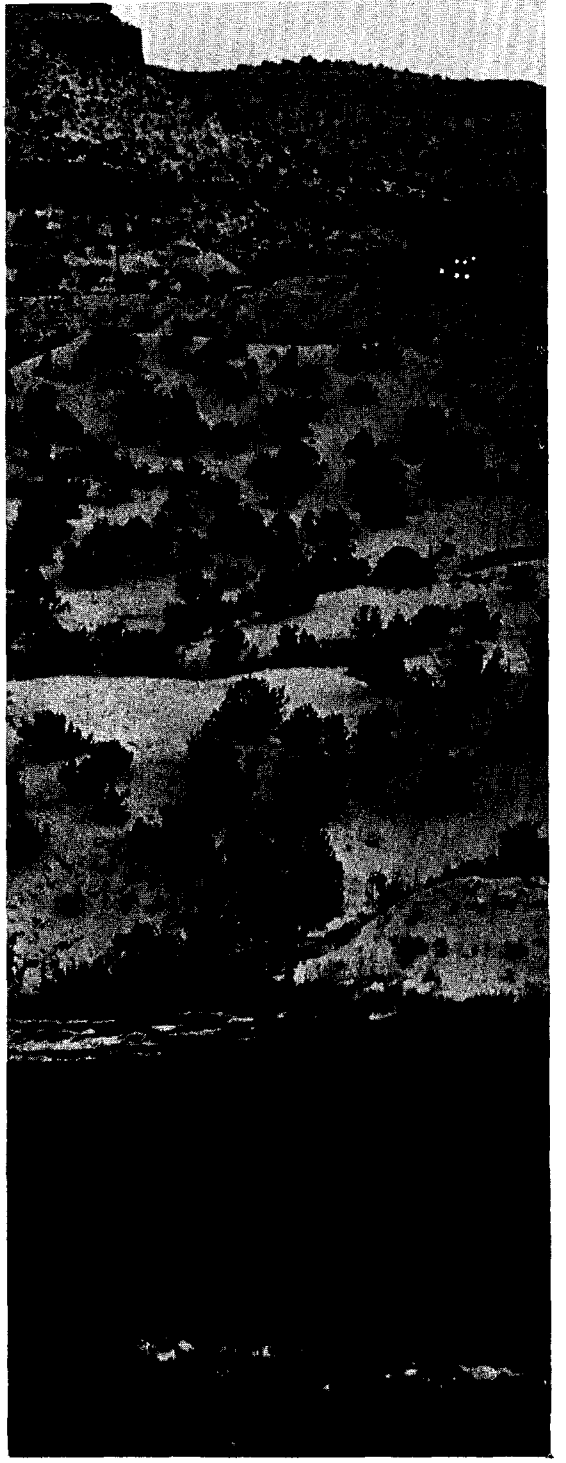


The white area on this map represents that part of Northern New Mexico from which LASL employees commute.



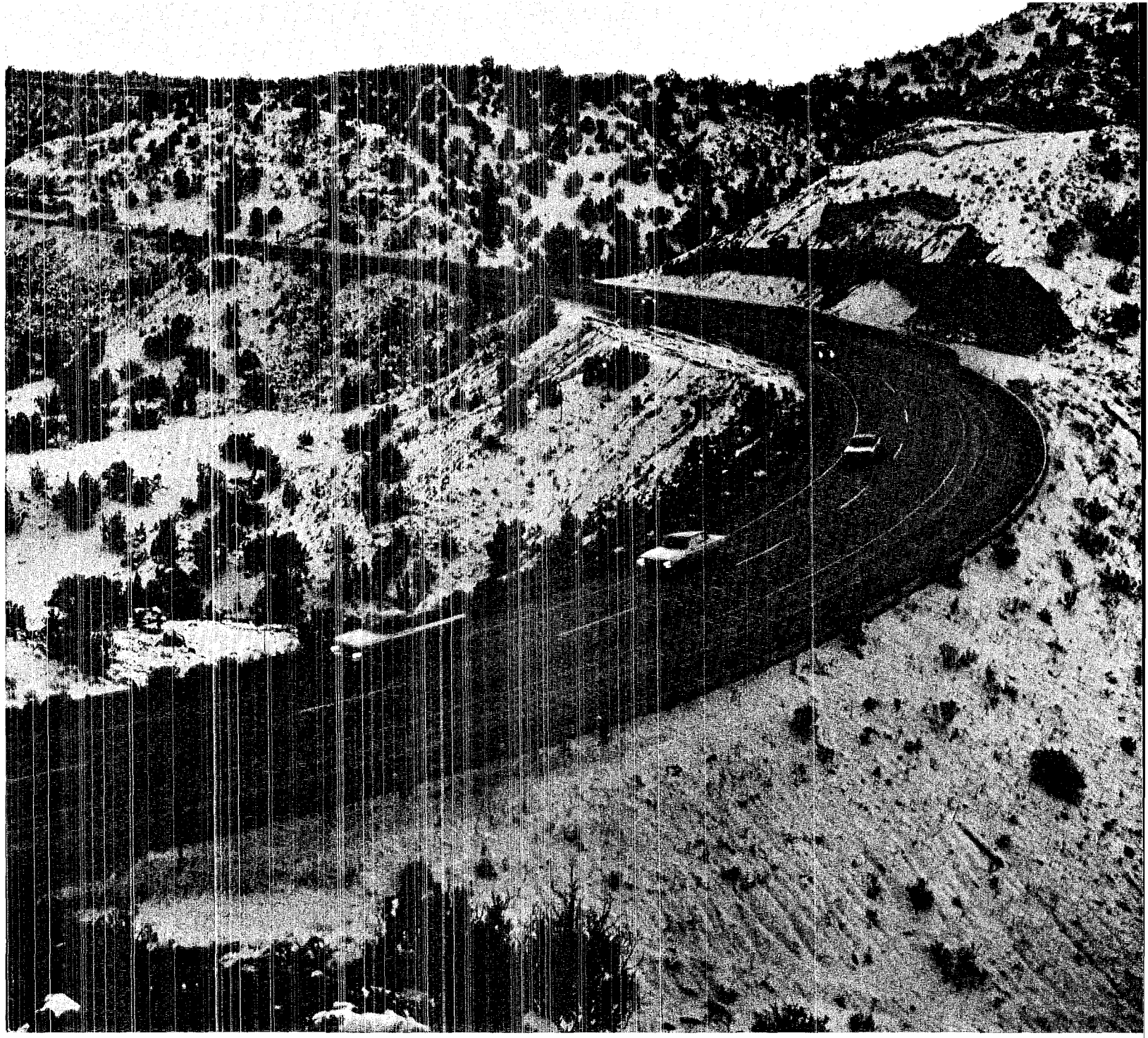


At dusk, LASL commuters leave the Hill and head for home.

from a large area in northern New Mexico. The approximate boundaries can easily be plotted on any road map by drawing a line from Los Alamos to El Rito, to Embudo, to Taos, to Santa Fe, to Albuquerque, to Jemez Springs, and back to Los Alamos.

Reasons why employees prefer to commute vary greatly. When housing in Los Alamos was government-owned, for example, many people built or bought homes elsewhere and have continued to reside there. Others prefer the difference in climate off the Hill. Some commute because they have been able to buy more acreage elsewhere than was available on the Hill, they have more privacy, or they have family ties.

The most distant commuters are probably those from Albuquerque, about 100 miles south of Los Alamos. Among the few that commute from Albuquerque is Leo Chelius, Sr., H-1. Chelius has been employed by the Laboratory for more than 18 years. For 16 years, he lived in Los Alamos, but two and a half years ago he moved to Albuquerque because he prefers city life. Chelius travels about 50,000 miles a year



commuting to and from work. He leaves his home about 6 a.m. and returns about 6:45 in the evenings. Traffic is fairly light, Chelius said, except between Pojoaque and Los Alamos. "Santa Fe is the real bottleneck. There are so many stop lights. But after I get through them in the evenings, I feel like I'm home."

A few miles north of Albuquerque, at Corrales, Daniel James, D-8, has a home on about two acres of land. Like Chelius, he leaves home about 6 a.m. each workday. He slips through Santa Fe only minutes before its work force converges on the streets and encounters only light traffic until he reaches Pojoaque. James enjoys the drive from Corrales. He was living in that area when he was hired by the Laboratory two years ago. He lived in Los Alamos for a year before moving back.

Alfredo Gonzales, GMX-3, a LASL employee of 20 years, has been commuting from Taos for the past 10. It's 77 miles from his home to S-Site where he works. He sets his alarm clock for 5 every morning, although from habit, he is generally up before it goes off. He

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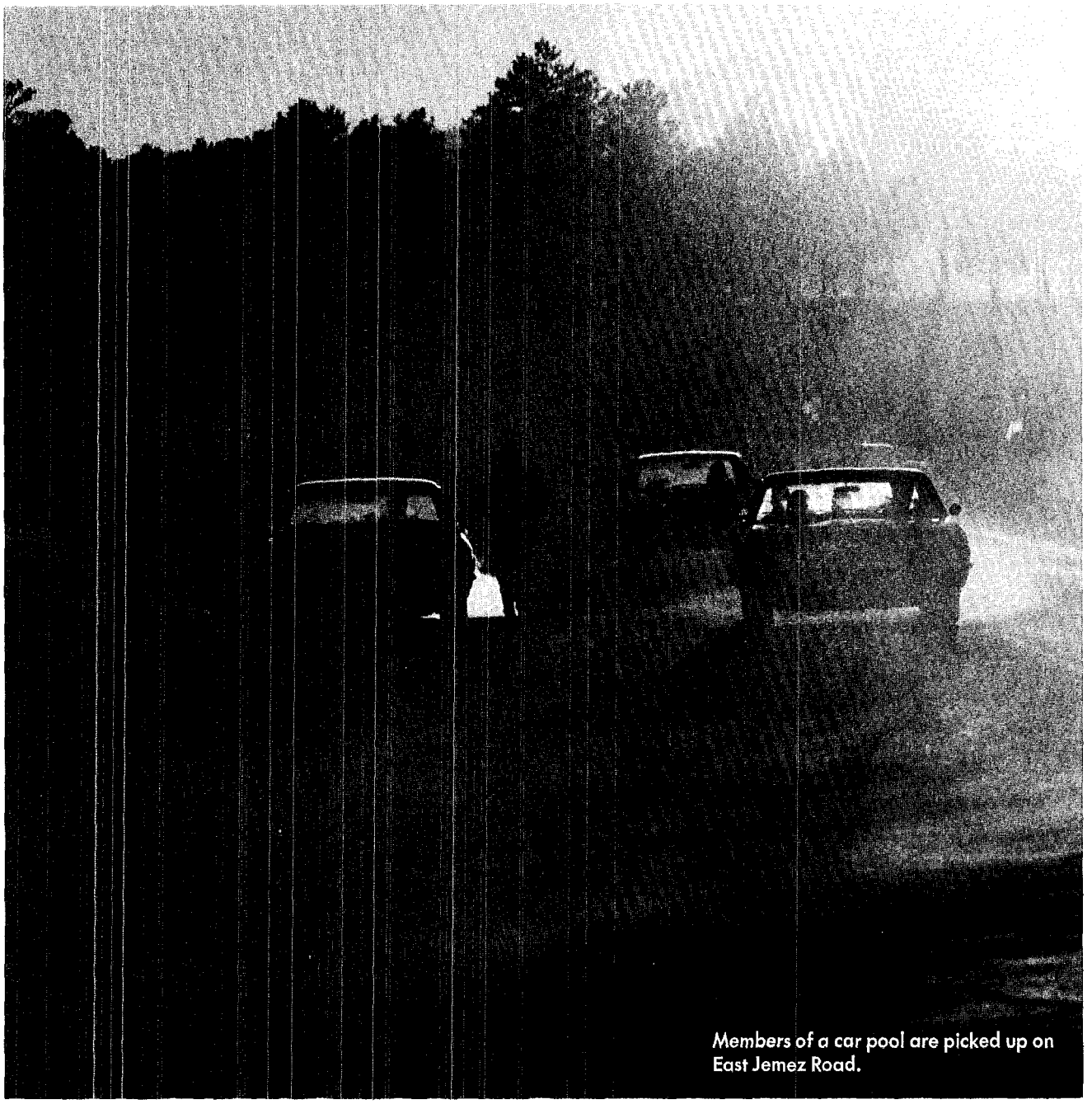

Members of a car pool are picked up on East Jemez Road.

leaves his home about 6 a.m. and encounters fairly heavy traffic because of miners on their way to work in Taos and Red River. Gonzales lived in Los Alamos during the first 10 years he was employed by the Laboratory. His family lived in Taos where he had cattle interests and family ties. At the time, he was working "swing shift" from 4 p.m. until midnight. When he went home on weekends, he would arrive sometime after 1 a.m. and spend considerable time looking after his cattle. Commuting allows him more time with his family.

Florencio Archuleta, H-1, commutes 60 miles from El Rito to his job at TA-50 each day. Before hiring on at the Laboratory nine years ago, he was employed by Zia Company. Archuleta enjoys the climate in El Rito and the hunting and fishing the surrounding area offers.

Ruth Beaty, Dir. Off., and her husband, Leslie H., a Zia Company engineer, commute 30 miles to and from Tesuque each workday, a 35 to 40 minute drive. They have a home they built themselves on five acres on the Tesuque River and have been commuting from there for the past four years. Prior to that they lived in government-owned housing in Los Alamos. "We wanted to build a house the way we

wanted it and you couldn't find land in Los Alamos then like we have in Tesuque," she said.

Rosella Rivera, WSD, commutes from El Rancho, about 15 miles east of Los Alamos. She rides to work with two other employees and pays one of them a fee for transportation. A LASL employee of nine years, she is a native of El Rancho and her home is about centrally located between Los Alamos and Pojoaque where her husband teaches school.

An office companion of Mrs. Rivera's, Lorraine Martinez, Chimayo, is one of six members in a car pool. Each member drives the 30 miles to and from work for a week at a time.

On the west side of the Jemez Mountains, several LASL employees have built homes at La Cueva, about 10 miles north of Jemez Springs.

Jesse Clark, P-9, lives at La Cueva, a distance from Los Alamos of about 30 miles. "It's about a 45-minute drive to work and never more than an hour," Clark said. "If I had to make the trip on a freeway I wouldn't do it. I like the outdoors . . . there is good fishing within a half mile of our home and I see a lot of elk, deer, turkeys and bears during the drive to and from work."

Bob Luders, P-9, and his wife Connie, T-9, also commute from La Cueva. Both have been employed at Los Alamos since 1944, although Bob was first employed by the U.S. Army. They bought some land at La Cueva for a cabin. But, they built a house instead "because we were living at the wrong end of an unsplittable duplex." The house was designed by their son, Chuck, in a high school mechanical drawing class.

Ed Duran, SD-5, is a member of a car pool along with Ernie Montoya, ENG-5, Tom Dominguez, P-16, Dick Glass, N-7, and Jon Barnes, AO-2. He has been commuting from Santa Fe for 17 years. He was first employed by Zia Com-

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At left are Leo Chelius, Sr., H-1, who commutes to work from Albuquerque, and Daniel James, D-8, a commuter from Corrales. Below, three members of D-8, who drive each workday from Santa Fe, stop at a roadside cafe for breakfast. They are Jose (Mitzie) Ulibarri, John Sandoval, and Henry Ortega. The waitress is Gloria Roybal.

Bob Luders, P-9, and his wife, Connie, drive to work from La Cueva each workday.

pany and rode a motorcycle to work. "Housing wasn't available in Los Alamos then, and when it was, I had a big family, six children, and housing just never caught up with us." For Duran, it's a 72-mile round trip each work-day. Leaving home at 7 a.m. and returning at 6 p.m. "seems a part of my job."

Some employees are part-time commuters. They live in Los Alamos during weekdays, but have homes elsewhere on weekends, such as Eluterio Garcia, SD-DO, who has an apartment in Los Alamos, but drives to his parents home in Abiquiu every weekend.

Arthur Montoya, PER-4, Juan P. Martinez, GMX-3, and Arturo Lucero, GMX-3, share an apartment in Los Alamos during weekdays. On the weekends, however, they separate. Martinez spends the weekend with his wife and five children in Ojo Sarco; Lucero goes to El Rito to be with his wife and four children; Montoya goes to Las Vegas where he has a home and his wife teaches school.

This is only a sampling of commuters who work for the Laboratory. However, it points out that LASL has a large investment in the interests of Northern New Mexico.

Arthur Montoya, PER-4, leaves the apartment where he lives weekdays. On weekends he drives to Las Vegas to be with his wife.

Noise Control

The railroad engineer of a century ago probably accepted noises produced by his locomotive without question. He may have even enjoyed them.

But, if he had known then what is known today about noise and its effects, enjoyment would probably have turned to worry. For since then, investigations have ascertained that excessive exposure to noise can cause a reduction in hearing ability. It can also be annoying or distracting, or it can mask warning signals and interfere with communication.

By one definition, noise is unwanted sound. Unfortunately, it can't be thrown away like yesterday's newspaper, but it can be controlled. At the Los Alamos Scientific Laboratory, industrial hygienists of Group H-5 investigate noise problems and make recommendations for their control.

Although primarily concerned with those problems that can affect the individual's hearing, hygienists will tackle a nuisance noise problem too. The nuisance noise can cause pyschological tensions affecting the work efficiency of an employee. It might also cover up warning signals resulting in serious safety problems.

In carrying out investigations, the industrial hygienist will use two pieces of equipment. One of them is a sound level meter– sometimes called an "applause" meter– which measures noise intensity in decibels. The other is an octave band analyzer which measures intensity as a function of frequency or pitch. Most noise is a mixture of many frequencies being sounded

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The sound level meter and octave band analyzer are used in combination by H-5 Industrial Hygienist Jim DeField to measure noise from the gasoline-powered air sampler, shown in foreground. Technician Darell Bevis records the measurements. When plotted, together with time of exposure, these measurements indicate the degree of risk to an individual's hearing.

simultaneously. The octave band analyzer sorts the sounds into a series of octaves measured in hertz, or cycles per second, and measures the intensity in each octave.

When a curve is plotted in terms of decibels and hertz, the measurements become meaningful. These components of noise, which present the greatest risk of hearing damage, are considered as a function of time, to determine the degree of risk to the individual.

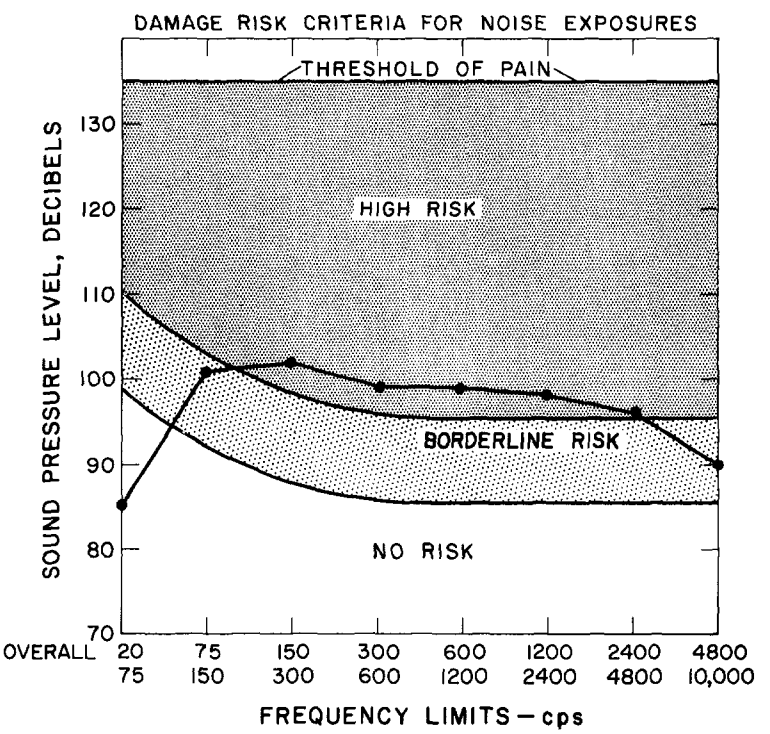
In a recent demonstration, a sound level meter and octave band analyzer were used to measure the intensity and frequency of the noise from a gasoline-powered air sampler. The measurements were then plotted on the standard curve. In the octave of 20 to 75 hertz, there was no risk. A borderline risk was reflected from 75 through 150 hertz, and a high risk was shown from 150 through 4,800 hertz. The noise intensity, in its plotted configuration, then dropped into the borderline and no risk areas at higher frequencies. Such a broad band noise would be considered hazardous to hearing if continued for eight hours.

Although each noise complaint must be evaluated on an individual basis, corrective measures recommended usually depend on whether the noise problem is one of short or continuous duration. If a noise condition is found to be potentially harmful but is temporary in nature, such as that of bleeding off gas at high pressure, an explosion, or discharge of a capacitor bank, the hygienist may recommend ear plugs or muffs. If the condition is continuous throughout each workweek, he will more than likely recommend that the noisemaker be insulated or isolated in order to reduce the noise to a tolerable level. Examples of continuous noises to which a person might be exposed include those made by compressors, lathes, furnaces and ventilation systems. When the source of harmful noise cannot be controlled, ear plugs or muffs may be used to protect the individual.

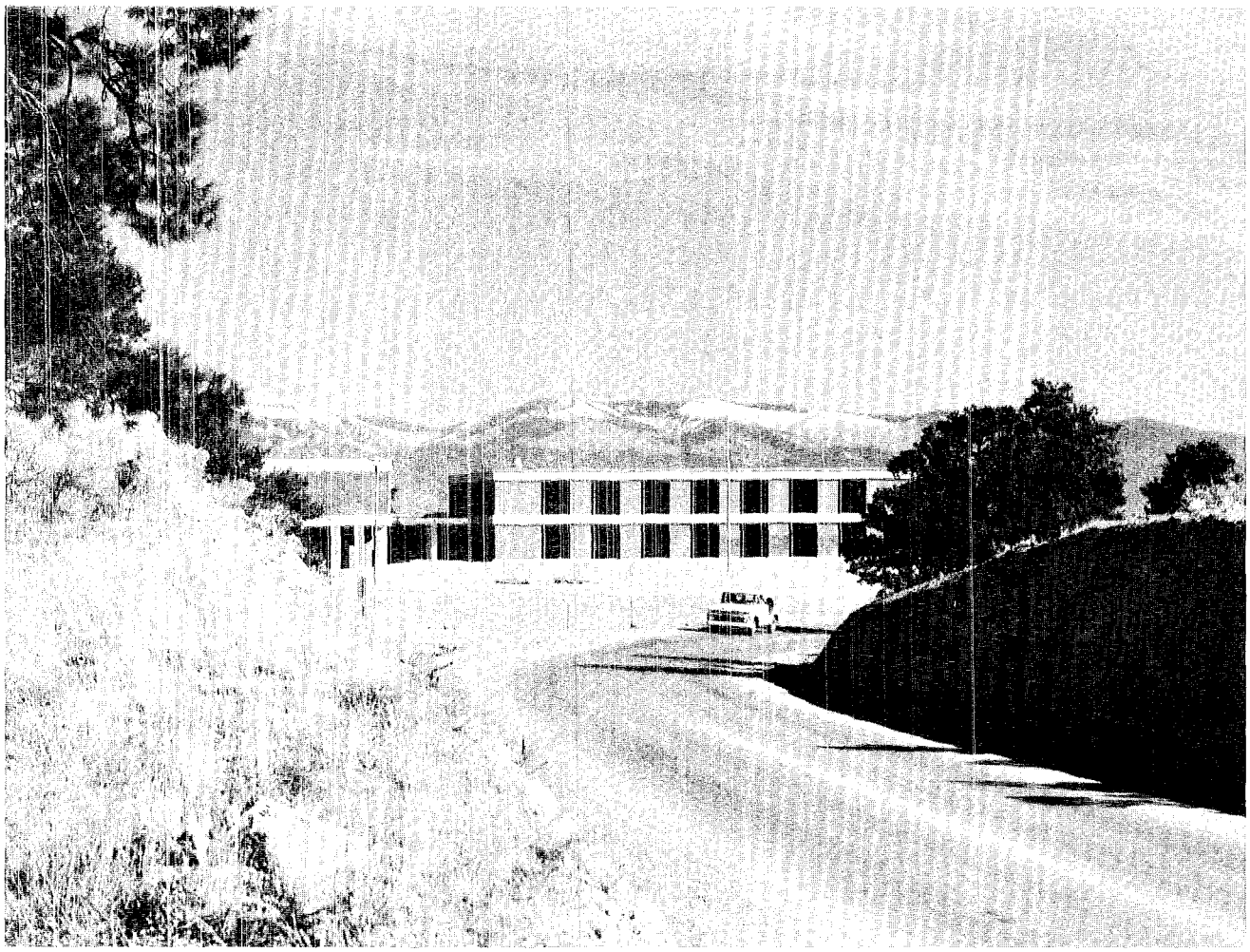
In either case, if no corrective measures are introduced, temporary or permanent hearing losses can result, depending on noise intensity and length of time exposed to it. Temporary hearing losses (auditory fatigue) are those which are recoverable after a period of isolation from the noise. Such losses may occur after a few minutes of exposure to a loud noise. Prolonged noise over a period of months or years can do physical damage to the hearing organ with only partial or no recovery.

While noise control plays an important role in safeguarding an individual's hearing, it is not meant to imply that all hearing losses are due to excessive exposure. The LASL industrial hygienist is quick to point out that disease or injury can also cause varying degrees of deafness. Some loss of hearing due to aging of an individual (presbycusis) is also normal and is especially pronounced in certain frequency ranges.

Under the Walsh-Healy Public Contracts Act, standards of permissible noise have recently been adopted which are applicable to all federal contractors. Essentially, these are similar to the standards mentioned previously, but, measurements may be taken by a single, suitably calibrated sound level meter.



When plotted, measurements of noise from the gasoline-powered air sampler showed the noise to be in a high risk area from 150 through 4,800 hertz (CPS). The curve is based on eight hours of exposure.



As the road straightens out near the top of Mesita de Los Alamos, the Laboratory-Office building is framed between its banks.

Another Look at LAMPF

"A Look at LAMPF," printed in The Atom a year ago, was a non-technical explanation of the Los Alamos Meson Physics Facility. Upon delivery from the printers it was a "sell-out" even though extra copies were ordered. It was reprinted twice for special uses and is still used as a handout to official visitors and the general public alike who attend regularly scheduled tours of the LAMPF site. Basically, the contents of the article are still sound, but somewhat outdated. In the passage of a year there has been considerable progress in both construction and technology. There are also new ramifications, changes and additions. While not as detailed as the first article, "Another Look at LAMPF" defines the facility's current status.

Near the top of Mesita de Los Alamos the road straightens out. Its high banks frame a portion of the Meson Physics Facility's nearly-completed Laboratory-Office building which MP division will occupy next month.

The road curves right and then left to the south side of this large brown-brick structure with gray-white cement trim. From here can be seen most of the Los Alamos Meson Physics Facility that has either been completed or is under construction. Looking back toward the west is the Equipment Test laboratory which was completed more than a year ago, and where much of LAMPF's accelerator is now being fabricated. On a hillside to the

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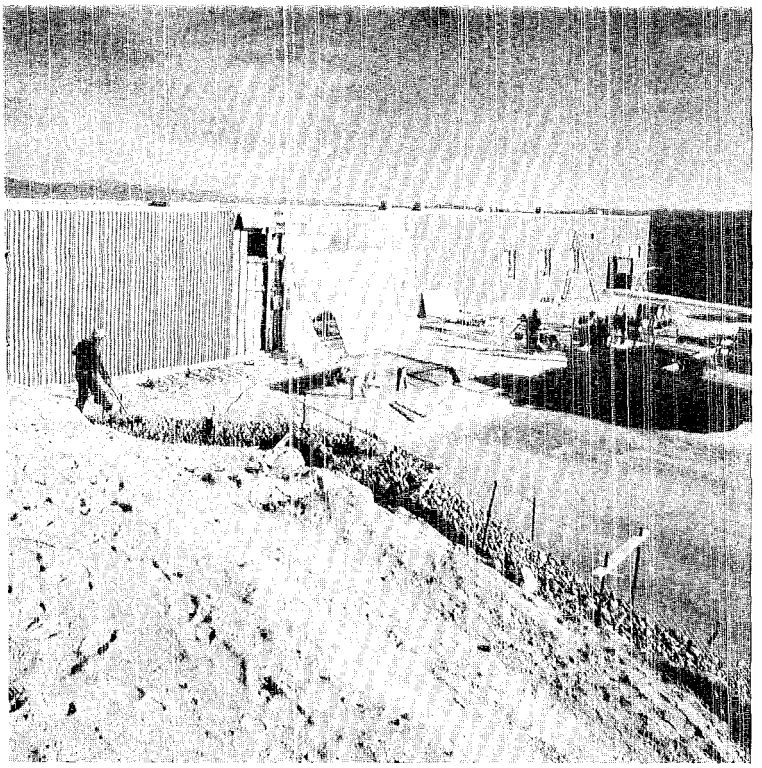
From the south side of the Laboratory-Office building can be seen the long, metal, shed-like structure that will contain a maintenance corridor and clusters of the accelerator's radio-frequency and control systems.

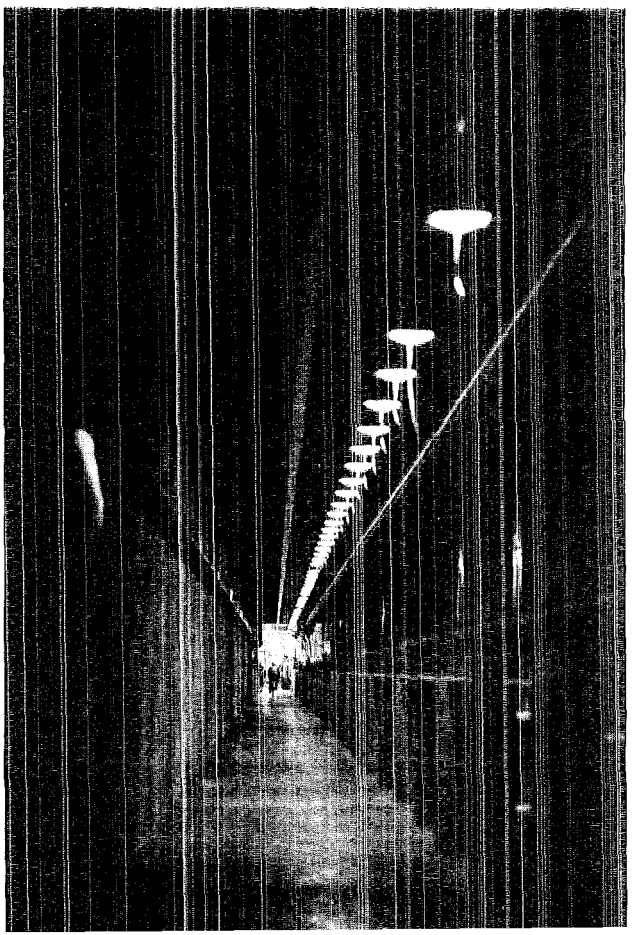
northwest is the million-gallon water storage tank and just east of the Laboratory-Office building, the 115 kilovolt electrical substation stands ready to accept power. Next to it is the recently completed Injector building which will house the first unit of the three-unit accelerator. In series with the Injector building is a nearly half-mile-long, metal, shed-like building that will contain a maintenance corridor and clusters of the accelerator's radio frequency system and controls. Beneath it is the tunnel where the linear portion of the accelerator will be located.

Near the east end of the maintenance corridor, construction is proceeding on another structure. This is the Operations building where a computer will command most of LAMPF's operating systems. From here, workmen can be seen in the switchyard area which will channel the beams of particles to the experimental areas. Beyond the switchyard is the large clearing where the first of the experimental areas is being built.



Near the east end of the maintenance corridor, construction continues on the Operations building. Its contents will include the digital computer which will command most of LAMPF's operating systems.

Support structures for the accelerator line the tunnel.



The LAMPF building project is massive. When completed the facility will make up one-fifth of the Los Alamos Scientific Laboratory's total capital investment.

It will be a basic research facility whose accelerator will produce a variety of particles vital to the future of investigations of nuclear structure, nuclear forces and the properties of mesons which are intimately associated with the binding of one nucleon to another.

It will have tremendous impact on the scientific community. The meson facility will be national in character in that its operation time will be shared by scientists of the Laboratory and others from throughout the United States, but primarily from the Rocky Mountain region.

The non-LASL scientists are represented through the Users Group. More than 300 persons, representing scientists from more than 100 colleges, universities, laboratories and medical institutions throughout the country are now members of this group. It serves as a communications link between the Laboratory and various research scientists from all parts of the United States. Consistent with their purpose, the Users are playing an important role in the planning of the experimental areas through their suggestions of both experiments that can be conducted at the facility and associated equipment requirements.

Economically, construction of the meson facility, or factory, is having large impact on the State of New Mexico. Approximately $7 million a year is being paid out in salaries to an estimated 600 New Mexicans. These include the more than 200 members of MP division, 100 other Laboratory employees doing LAMPF-related work, 150 construction workers, and another 100 persons in private industry who are providing equipment for the facility.

The meson factory has also had an impact on the general public. Until November, tours were conducted by members of MP division. The number of visitors, however, grew and so did the time that division members were putting into it. Assistance was volunteered by PUB-2 which now conducts special tours for interested civic organizations and regularly scheduled tours for all comers who are at least 18 years of age. The regular tours begin at 5:15 p.m. the first Monday of each month from in front of the Personnel building. By the time the tour reaches the site, workmen have left, so visitors are not endangered by construction activities.

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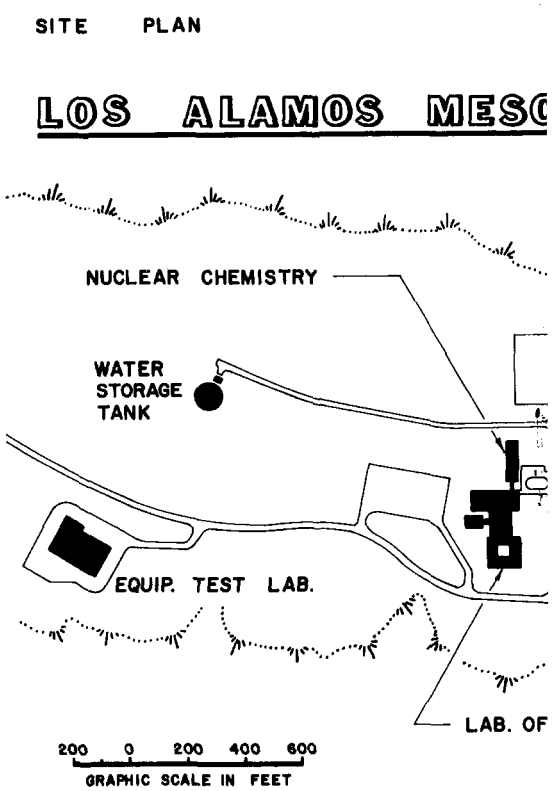
The switchyard, where beams of particles will be channeled to experimental areas, is under construction. Experimental Area A is being built at upper left.



Progress has been swift since the Bureau of the Budget released $26.2 million in Fiscal Year 1969. Including these funds, a total of about $33.5 million has been received and obligated.

Technology has been advanced on many fronts in the development of the LAMPF accelerator and its many associated systems. One advancement has enhanced beam availability in the experimental areas. Early concepts of the meson factory noted the possibility of accelerating two beams simultaneously; however, a number of technological problems had to be overcome. Most of these problems have been resolved and simultaneous beams seem assured.

In addition to a beam of protons (a proton is a hydrogen atom that has been stripped of its only electron), H^- particles (hydrogen atoms that have an extra electron attached) will be accelerated simultaneously. This will be accomplished by accelerating alternating bursts of protons and H^- particles. At the end of the accelerator the protons and the H^- particles will be separated by a magnet

and sent to separate experimental areas. The H^- particle beam can then be run through a thin "stripper" foil which will convert it into beams of neutral hydrogen atoms, protons, and H^+ particles. These secondary beams can be further separated by a magnet and channeled to a particular experiment.

The first unit of the accelerator will consist of three injector systems. Here the particles to be accelerated will originate and be taken up to an energy of 750 thousand electron volts (keV). One of the systems will produce the high-intensity proton beam, another will produce the H^- beam, and the third will produce a beam of polarized protons (protons spinning in the same direction).

Basically, each injector system consists of a high-voltage Cockcroft-Walton power supply, an ion source, an accelerating column, and a beam transport system to carry beams of particles from the three ion sources to the drift-tube unit of the accelerator. The beam-transport system also bunches the beams into short bursts for efficient insertion into the drift-tube linac.

The Cockcroft-Walton for the high-intensity proton beam has been installed and tested to one million electron volts, and its ion source has been developed and tested. Parts of the accelerating column are being checked and assembled while other parts are on order. All components of the beam transport have been ordered and some are being tested. The high-intensity injector system should be operational in April.

The power supply for the H^- injector system is being fabricated and delivery is expected late this year.

The second unit of the accelerator is the drift-tube unit, a series of four tanks that will accept particles from the injector systems and accelerate them from 750 keV to 100 MeV (million electron volts). The first of these tanks has been installed in the beam channel. It is called the five MeV tank because this is the energy to which it will accelerate particles. This tank and the proton injector will be linked and operated to make definitive measurements of the beam and its properties. The other three tanks are being fabricated.

The side-coupled cavity unit which will accelerate particles to 800 MeV is the longest portion of the half-mile-long accelerator. It is being fabricated in the Equipment Test laboratory. Here its parts are given a dimensional inspection when received from private industry; they are machined to critical tolerances and tuned to resonate at the appropriate radio frequency. In this unit of the accelerator there are 15,000 copper forgings,

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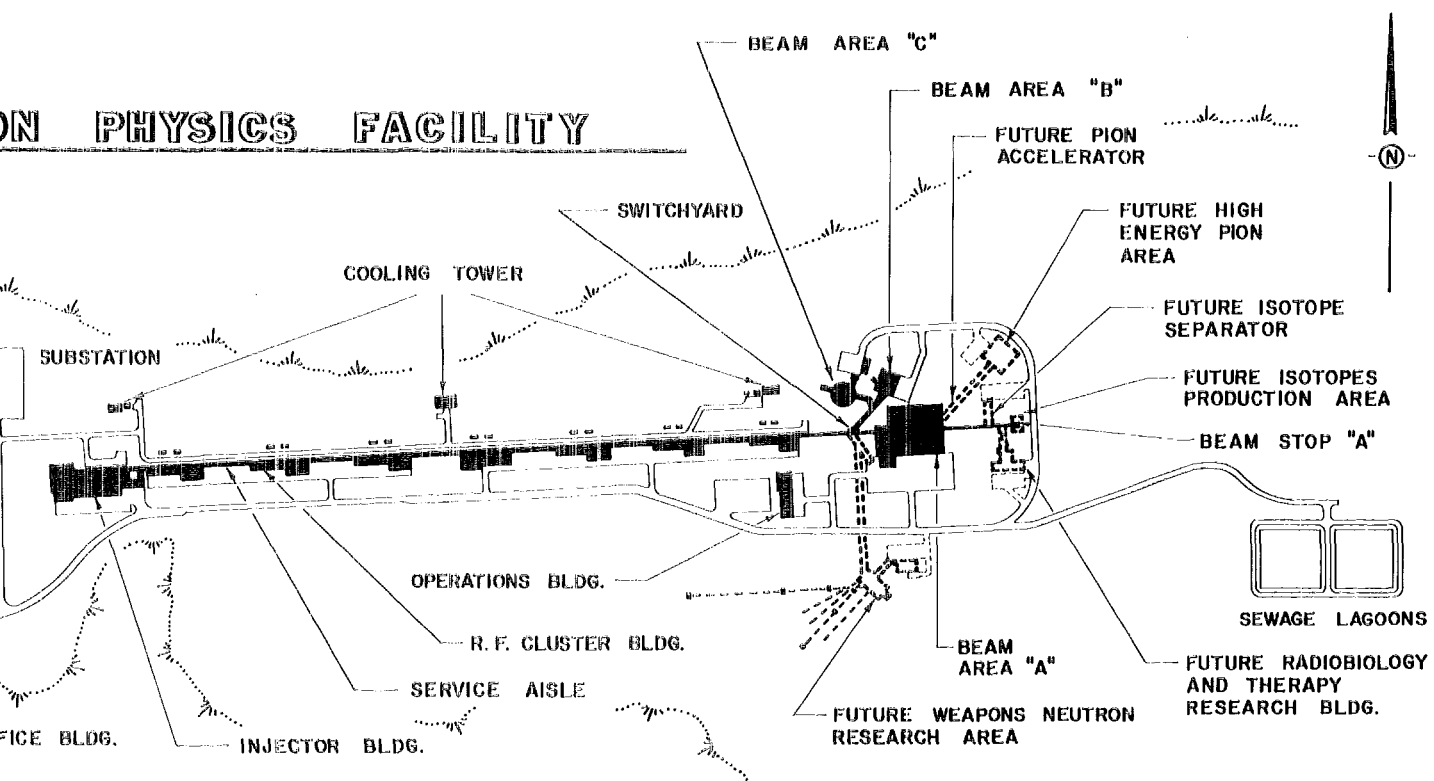

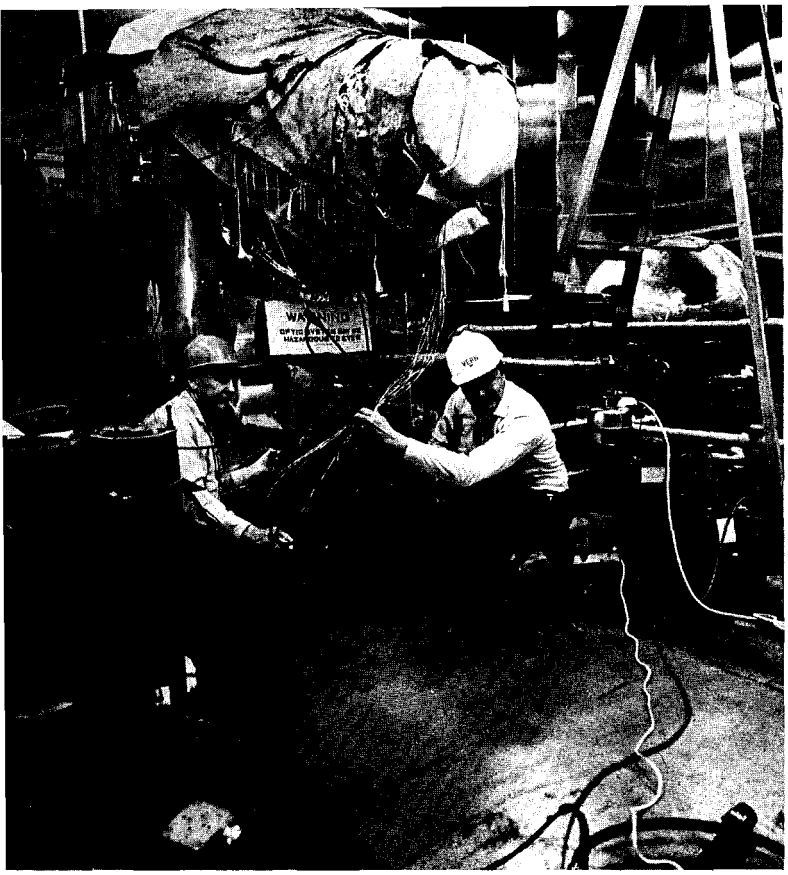

In the Injector building, Harold Lederer and Laverne Rogers, both of MP-1, work on the first of three injector systems. Behind them is the equipment dome which contains control panels.

weighing a total of 800,000 pounds. The forgings are brazed together sequentially. Each resonant cell involves several brazings for its assembly. The cells are brazed together to form sections and sections are assembled to form modules.

In all there will be 45 modules. One has been completed and work has begun on the second. The completed module has been set up in the radio-frequency test stand area of the Equipment Test laboratory. It is being fitted with its vacuum and cooling systems and will be powered to see that its cavities are working properly.

Not all modules will be assembled and tested in the laboratory. Subsequent ones will be assembled in the accelerator tunnel.

Approximately 80 per cent of the radio-frequency power systems which will energize the accelerator has either been purchased or is on order. Basically, there are two systems—one for the drift tube unit of the accelerator and the other for the side-coupled cavity unit. The first consists of four amplifiers which operate at peak powers as high as three megawatts and have, as a nucleus, conventional electron tubes. The other system consists of 45 amplifiers which operate at peak powers of 1.25 megawatts. Each of these amplifiers is built around a large klystron tube.

Through an extensive development program at the Laboratory, the state-of-the-art of these electron tubes has been greatly advanced. A sampling of them is being tested for such things as power output, performance and life expectancy. A total of 12,000 hours running-time experience has been logged so far and one klystron has been operated for 2,500 hours.

The tubes are being tested at 12 per cent duty factor. This means the tube is on 12 per cent of the time and off 88 per cent of the time. It is turned on 120 times per second.

Initially the accelerator is scheduled to be operated at a duty factor of six per cent. MP division officials are confident that this duty factor will be attained without danger of damaging any of its systems. Eventually they hope to raise this duty factor to 12 per cent.

A contract has been negotiated for 45 klystrons. Before they are installed in the cluster building, they will be tested for a short time to discover any "infant mortalities."

LAMPF will use approximately 40 megawatts of electrical power, as much as is presently being used by the Laboratory and community of Los Alamos combined. A new power line will provide power to a substation for all of the Laboratory's Eastern Technical area. The substation is expected to be completed in May and a temporary line is furnishing power to the meson facility site until the new one is constructed.

The meson factory will have a massive and complex control system that includes communications, television, radiation safety devices, and a digital computer with appropriate interface units for operation of the accelerator.

Many accelerator facilities have small computers that exercise limited control, but none has a computer control program as comprehensive as that which LAMPF will have. Through its computer, the accelerator will be turned on and off and the many systems which affect its operation, such as radio frequency, cooling, vacuum, steering and focusing magnets, can be monitored and controlled. The computer will also help in locating equipment malfunctions and supervise the operation of radiation safety devices; it will have a bookkeeping capability for operating procedures

and for the vital statistics of all components of the accelerator as a function of time.

A computer program as extensive as this requires a veritable maze of interfacing units. These include the console through which human operators will signal their instructions to the computer, the units which will accept, interpret and transmit the message to the appropriate accelerator system, and those that will check and relay the system's response back through the computer to the console operator. Many systems will also be provided with local controls that can be operated manually when necessary. A capability will be built into them so control can be switched from

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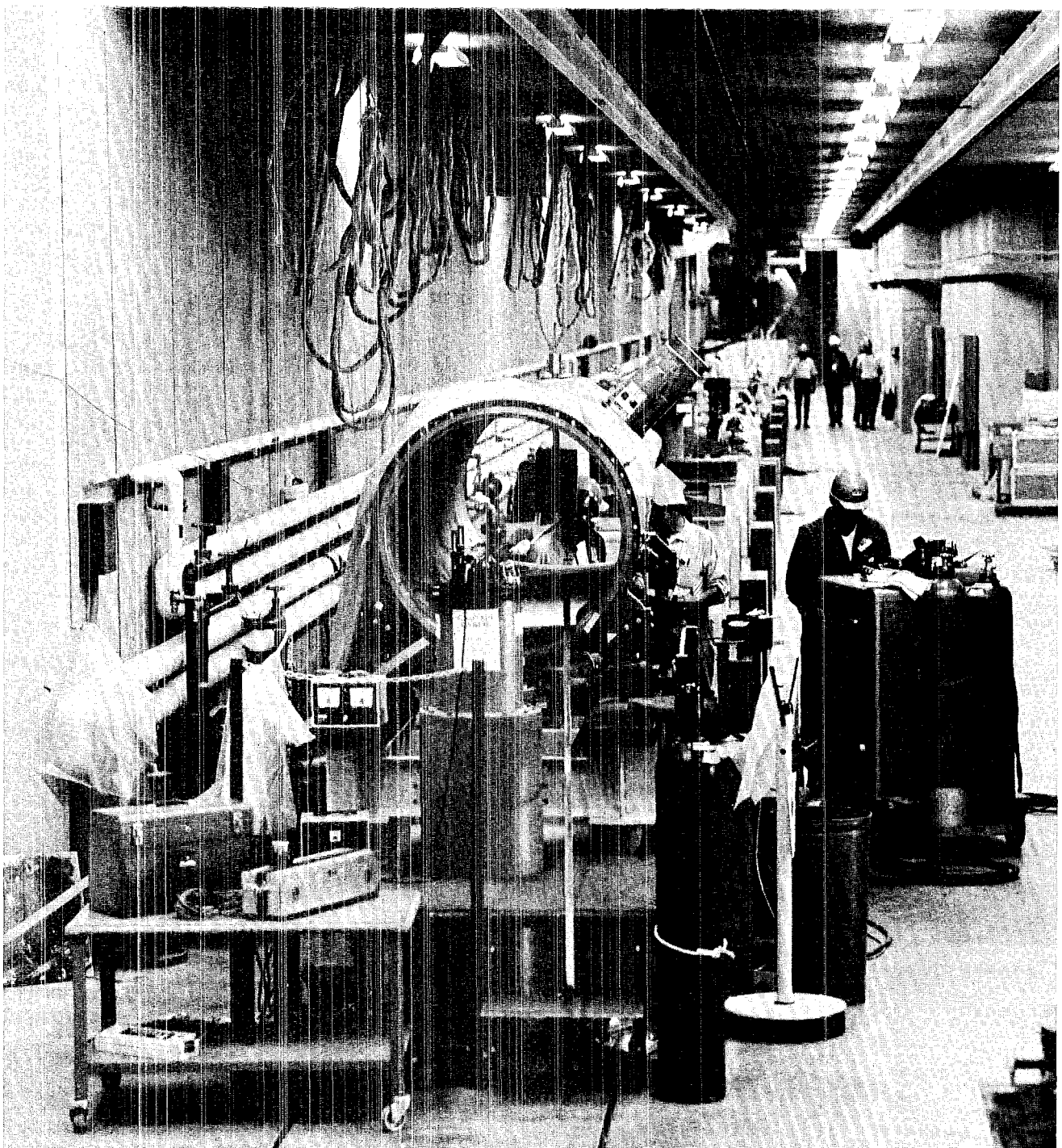
The first of four drift-tube tanks is installed in the accelerator tunnel.



local back to central. These are the areas that command a major portion of the effort being applied to the dvelopment of LAMPF's control system.

About 80 per cent of the funds required for control system hardware has been obligated. As a result, considerable effort is being applied to acceptance testing and assembly of equipment being received in large quantities from private industry.

Installation of control system equipment on the high-intensity proton injector system is about 50 per cent complete and has just begun on other parts of the accelerator.

The digital computer will be delivered to Los Alamos sometime this month. It will be mounted and tested in a trailer while work progresses on the Operations building where eventually it will be installed.

Meanwhile, utilizing the Electron Prototype Accelerator (EPA), control system developmental work is continuing. Because EPA is essentially a prototype of the side-coupled cavity accelerator, it is a practical testing ground for systems to be incorporated into the meson factory. In addition, it is being used to develop appropriate computer programs and in building competence in operating an accelerator from a central location.

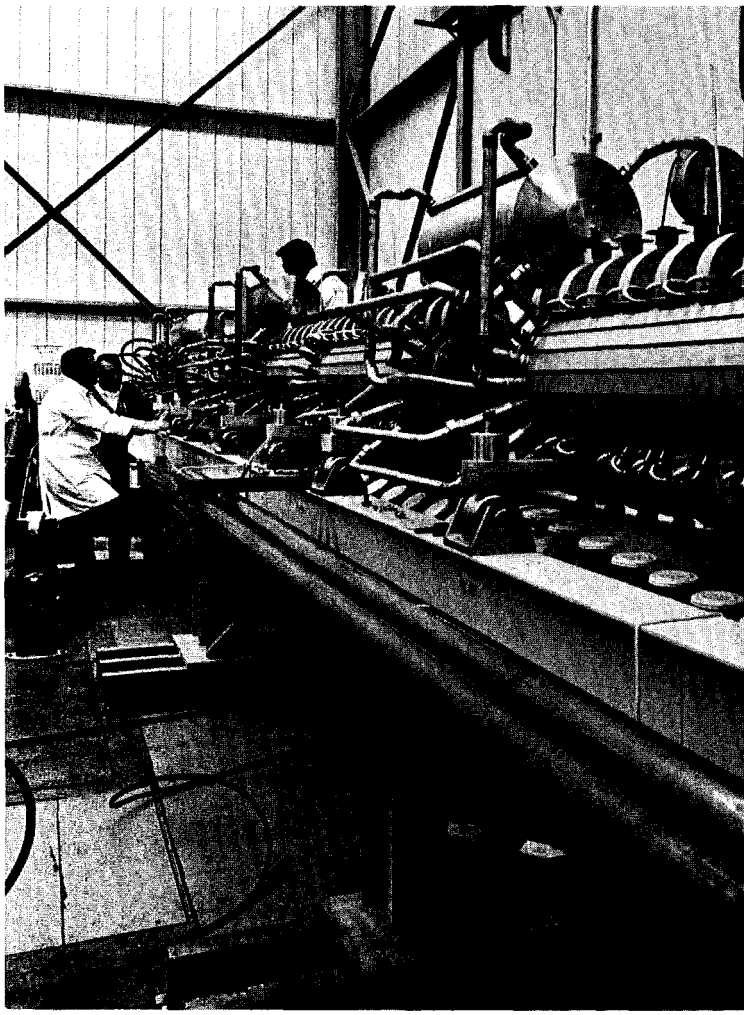
The EPA is also being used in several other development programs associated with LAMPF and some preliminary experiments that will be continued at the facility when it is operational.

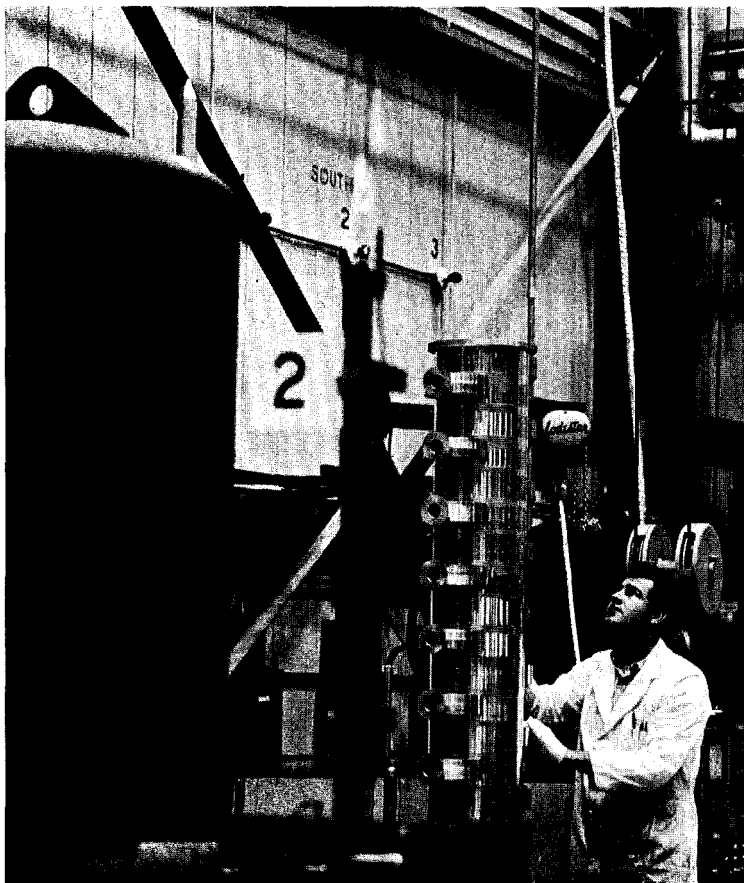
The programs include evaluating the side-coupled cavity system, testing theories of accelerator beam and radio-frequency interactions, target development, making radiation damage measurements to investigate the properties of super-conducting magnet-coils and other materials that might be used in the meson facility's systems.

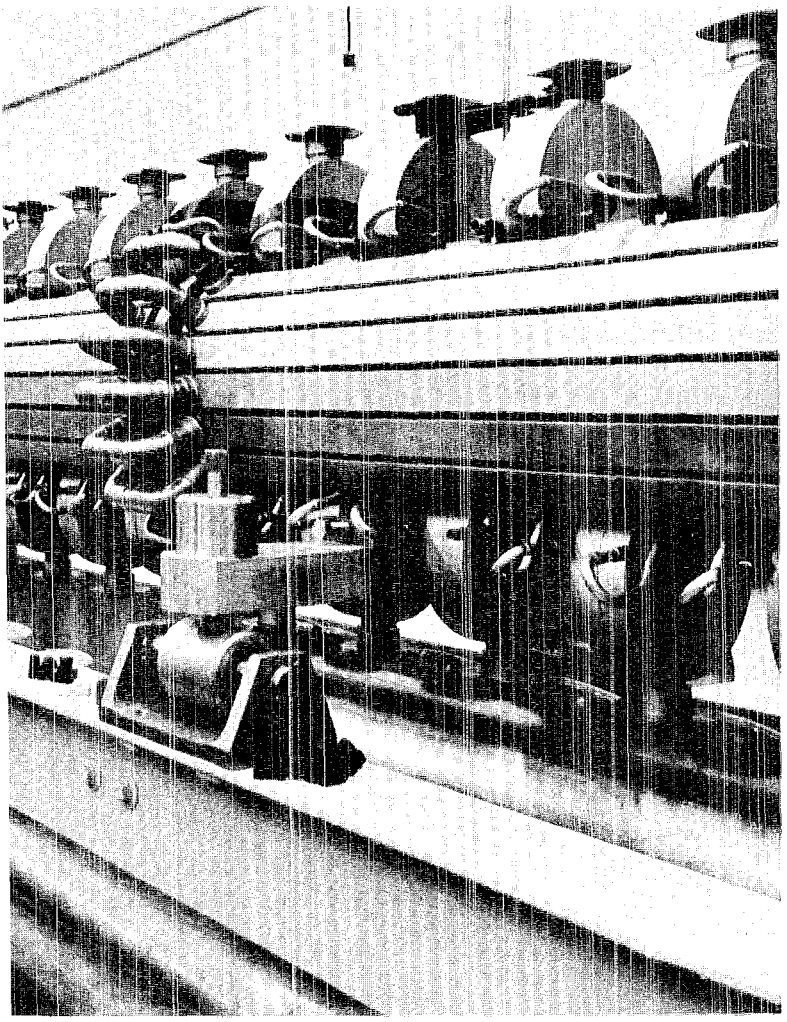
Weapons division will perform a plutonium neutronics experiment and a series of physics experiments will be conducted over the next two years to develop equipment and techniques for later experiments at LAMPF.

A group from Yale University has used the EPA to conduct a basic research experiment to investigate the probability of a gamma ray producing a proton from a nitrogen nucleus. The University of New Mexico's Medical Department is conducting a series of experiments to learn more about the mechanics of radiation damage in living tissue.

Construction funds of $5 million have been received in the current fiscal year and $10 million has been deferred to FY 1971. This delay, coupled







Above, working on the first completed side-coupled cavity module are Oliver Rivera, Joe VanDyke and Dennis West, all of MP-3. Left, Floyd Moore, MP-3, inspects a tank section after it has been brazed in one of the hydrogen furnaces at the Equipment Test laboratory.

with rising construction costs, will add $1 million to the total cost of the meson facility.

The Atomic Energy Commission, in recognizing this problem, has agreed to provide the extra $1 million when funds are available. This will bring total cost of the project to $56 million.

As a result of deferral of some of the Fiscal Year 1970 funds, completion of some of the experimental areas will be delayed by one year. A beam at the switchyard is, however, still scheduled for July 4, 1972. According to MP Division Leader Louis Rosen, "Every effort will be made to meet this schedule and MP personnel are confident it will be done."

The $5 million recently allocated, Rosen said, does not come under the President's construction freeze since it is earmarked to finish the accelerator and associated equipment needed for "Beam Day." This is an important interim goal in the meson factory building program. It is the date when a beam of protons will be sent through the accelerator.

"We must have that beam then," said MP-Division Leader Louis Rosen. "If not, it will be demoralizing to LAMPF users; it will hurt morale here, and, politically, it will hurt us in Washington. It's an enormous load, but it's important to the whole enterprise that we meet this goal."

With what funding is available in the current fiscal year earmarked for completing the accelerator, some site construction will be delayed unless additional funds are released early in FY 1971, although traditionally, LAMPF funds have been released in October.

Construction money needed is mostly for the experimental areas and also to build the Nuclear Chemistry wing on the north side of the Laboratory-Office building.

The first of three experimental areas, Area A, is under construction and design work is nearing completion on Areas B and C. Area A will be geared for pion-muon physics research. Pions are the mesons for which LAMPF is named. Area B will be a nuclear physics laboratory for experiments with protons and neutrons, and Area C will have a high resolution spectrometer for experiments with protons. Polarized protons will be used in Areas B and C.

The design of the experimental areas and determination of how they will be equipped is largely a function of what research will be conducted in them. Research proposals are submitted

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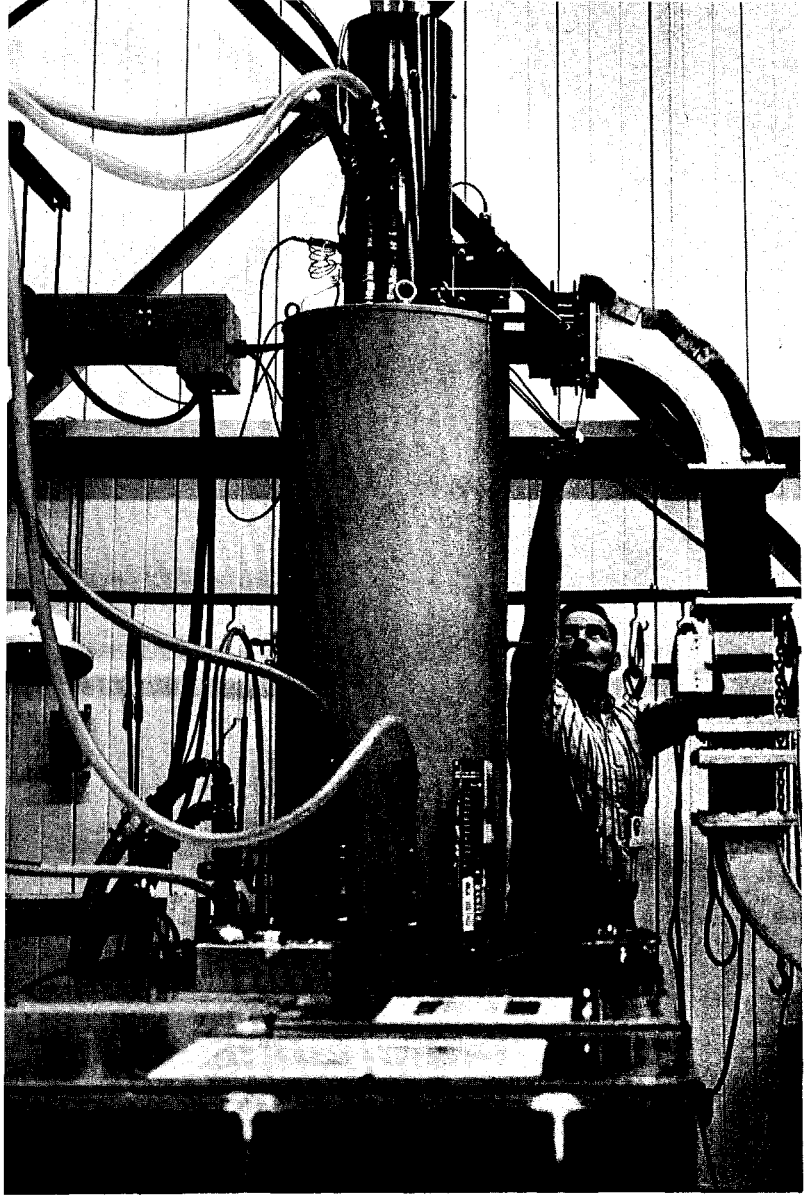
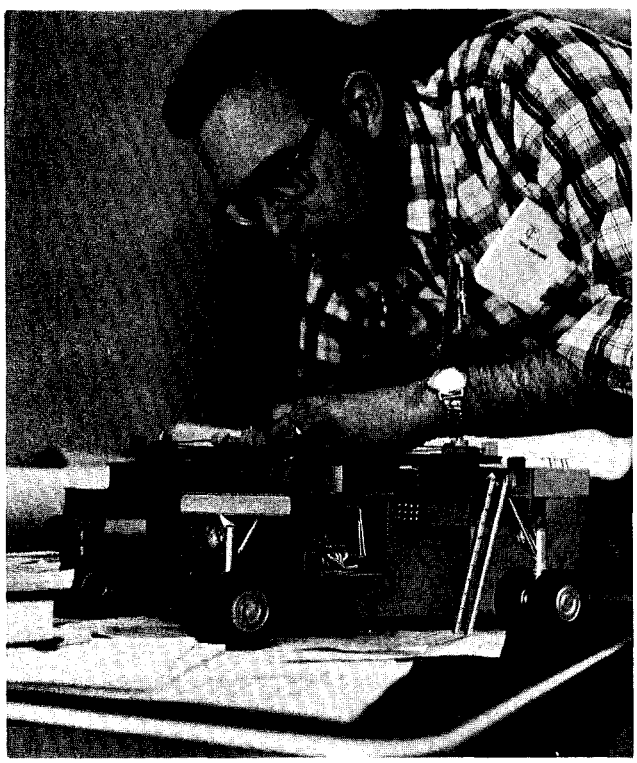


Left, Arlo Thomas, MP-2, checks out a klystron tube that is being tested at the Equipment Test laboratory. Below, Mahlon Wilson, MP-6, uses a scale model to demonstrate how the Merrimac will work.



by the scientists who will use the experimental areas and, to date, these have fairly well defined the potentials of B and C. Proposals are not as detailed for Area A. However, the general scope of pion and muon research has long been recognized, and to create proposals in as great detail as for the other two areas is not necessary at this time.

A problem in the experimental areas involves the maintenance and repair of elements in the target regions which will become highly radioactive. It will be resolved by the use of a 200-ton mobile hot cell containing remote handling facilities.

The mobile unit has been dubbed "The Merrimac" after the Civil War ironclad ship. It will be transported on a gantry crane and lowered over the elements to be maintained. The gantry's undercarriage, strangely enough, will be the landing gear of a military airplane, the B-52, which has been obtained from surplus.

Four other experimental areas, not included in the original site plans, have been proposed. One of them is the Weapons Neutron Research area, which will be built apart from other experimental areas. It will be the only facility at the site considered to be a restricted area. Other facilities proposed are the Isotope Production area where long-lived isotopes can be produced that will have practical industrial applications; the Isotope Separator facility where short-lived isotopes will be produced for experiments; and the Radiobiology and Therapy Research building.

short subjects

George A. Cowan, J-11 group leader and associate division leader, has been named 1970 chairman of the American Chemical Society's Division of Nuclear Chemistry and Technology.

The Division of Nuclear Chemistry and Technology is made up of approximately 1,000 nuclear chemists and engineers. Its purpose is to promote the interests of its members through a variety of activities including the presentation of technical programs, publication of papers, and a scholarship program.

G. Robert Keepin, N-6 group leader, has submitted a report on nuclear safeguards to the Nuclear Research Council's Panel on Nuclear Physics. The panel is conducting a survey of low and intermediate energy nuclear physics.

Keepin is a member of the Sub-panel on The Impact of Nuclear Physics on the Reactor and Fusion Devices Industries, Including Nuclear Safeguards.

His report includes techniques developed at LASL for assaying nuclear materials and how these techniques can be applied to problems in environmental control, including air and water pollution abatement.

Four LASL employees have retired in recent weeks. They are **Alfred Garcia,** GMX-3 laundry operator; **John Quackenbush,** SD-1 area representative; **Carpio R. Montoya,** SP-4 storesman; and **Carl Cartledge,** GMX-3 staff member.

Garcia retired March 2 and will live near Dixon. He was employed by GMX-3 in 1951.

Quackenbush was employed by the University of California for more than 20 years. He transferred to Los Alamos from the Los Angeles office in 1950. He and his wife will move to Santa Barbara, Calif.

Montoya was employed by SP-4 in 1948. He will reside in Chimayo.

Cartledge had been with the Laboratory for about 12 years. He will move to Vero Beach, Fla.

Robert Brownlee, J-DO, has been appointed scientific deputy of Joint Task Force Eight (JTF-8), succeeding F. C. Gilbert of the Lawrence Radiation Laboratory.

JTF-8 is the joint Atomic Energy Commission-Department of Defense organization charged with planning and carrying out overseas nuclear testing in the event of abrogation of the Nuclear Test Ban Treaty.

The scientific deputy is JTF-8's senior scientist who is responsible for coordinating the technical programs of overseas atmospheric test planning and advising the task force commander, Major General E. H. deSaussure, on all technical aspects of testing.

Brownlee has accepted the deputy's position in addition to his duties at the Laboratory. He has been with LASL since 1955 and has participated in most test operations since that time.

John W. Schroer, chief of the Operational Safety and Fire Protection Section in the Operations Branch of the AEC's Los Alamos Area Office has transferred to the Albuquerque Operations Office.

Schroer is the Emergency Planning and Special Projects Assistant in the Albuquerque Office's Operational Safety Division.

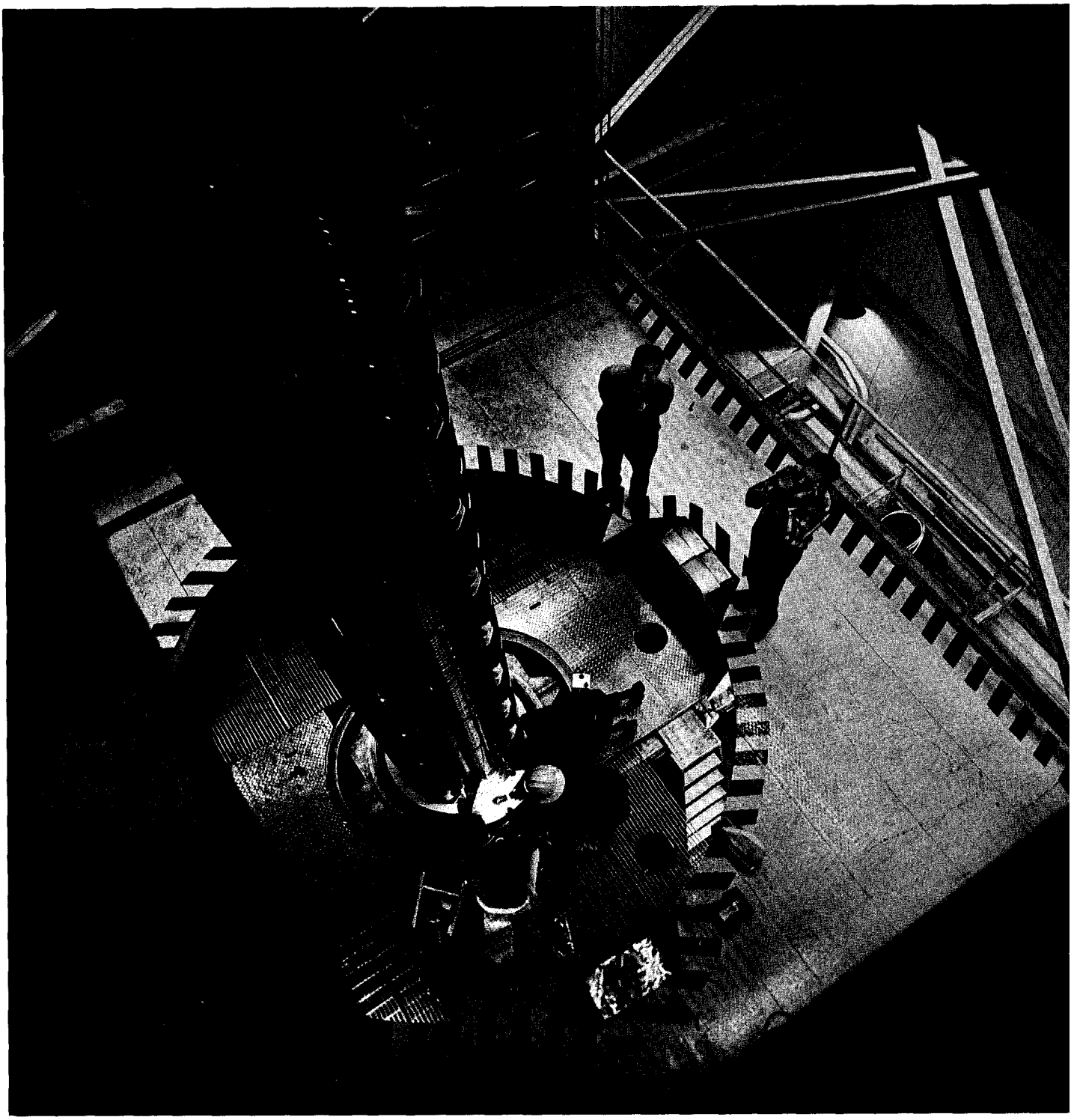
He came to Los Alamos in 1951.

Elmo R. Morgan, the University of California's vice-president for physical planning and construction will resign effective July 1.

Morgan has directed the planning, construction and operation of the physical facilities on the University's nine campuses since 1960, except for an 18-month stint with the Federal Government. He will become a corporate partner and senior vice-president in the management consulting firm of Rothrock, Reynolds and Reynolds of New York City and president of one of its subsidiaries, Rothrock Educational Consultants, Inc., headquartered in San Francisco.

During World War II, he served in the U.S. Army Corps of Engineers with the rank of colonel and for 11 years was involved in the construction, operation and maintenance of facilities for the Atomic Energy Commission at Los Alamos.

Members of P-9 install the Vertical Van de Graaff's new vacuum accelerating tube. At its base are Dick Seitz, Mal Wallis and Dick Woods. At upper left is Joe McKibben who designed the machine and its first tubes. At right is Richard Henkel, P-9 group leader.



The Year of the Tube

Orientals have a curious way of enumerating the years. In addition to a number, the year is also given a name. Last year was the Year of the Cock and this is the Year of the Dog. If P-9 were to adopt a similar convention, 1970 would probably be the Year of the Tube.

The tube is a large one, about a foot in diameter and 20 feet long. Commonly called a vacuum accelerating tube, it is that part of the Los Alamos Scientific Laboratory's Vertical Van de Graaff accelerator through which ions are accelerated to energy levels of several million electron volts.

In the process of replacing this tube recently, members of P-9 not only verified the accelerator's good electrostatic operation, they learned more about it through more reliable measurements than could have been made two decades ago when it was built.

The Vertical Van de Graaff was designed by Joe McKibben between 1946 and 1950. It was originally designed as an eight million volt machine but, as work continued, it was thought the machine would be capable of 12 million volts. It's potential use at this higher level, however, was limited by how much voltage its vacuum tube could accept. This maximum level was from eight to nine million volts so, the full energy capability of the accelerator was not utilized.

Until last month when a new vacuum tube was installed, tubes designed by McKibben were used in the accelerator. His last version served reliably for about 10 years. It has been accorded about 60,000 hours of hard use without modification and with only minor changes in the machine.

In recent years the tube's condition deteriorated to the point where the maximum voltage it would accept was seven million.

Before the new vacuum tube was installed, P-9 made some measurements to discover the Van de Graaff's full voltage capability. Richard Henkel, P-9 group leader, said that when not limited by the vacuum tube, the machine generated 14 million volts, a record for a Van de Graaff of this size and type.

The new tube is of British design and make. It has electrodes of eccentric shape arranged in a spiral pattern along the length of the tube. Ions from the source pass through the tube, but the eccentrically shaped electrodes cause secondary particles, originating on the surface of the tube, to move at such angles that they travel only a short distance before they encounter and are stopped by another electrode. A series of diaphragms with centrally located holes served this function in the McKibben-designed apparatus.

Henkel noted the British tube was the only one available with the desired characteristics and has been more than two years in the making.

Similar tubes have been known to withstand energy levels of about 10 MeV. The P-9 group leader said, "We'll be pleased with anything above eight MeV." The tube is currently being conditioned by applying voltage in gradually increasing increments until its full potential is reached.

"A large fraction of 100 low energy physicists do all or part of their research on the Vertical Van de Graaff every year," Henkel said. Through some of these experiments new isotopes have been discovered. In 1965, the vertical, in conjunction with the Tandem Van de Graaff, achieved a new record of 25.4 MeV for particle energies obtained with electrostatic accelerators. The vertical, Henkel and McKibben agree, will probably be in use for at least another decade.

the technical side

Presentation at National Youth Conference on the Atom, Chicago, Ill., Oct. 23-25:

"The Structure of the Upper Atmosphere" by D. M. Kerr, Jr., J-10 (invited)

Presentation at Defense Atomic Support Agency High Altitude Nuclear Effects Symposium, Albuquerque, Dec. 2-5:

"The Simulation of Binary Collision Processes in Plasmas" by T. A. Oliphant and C. W. Nielson, both P-18

"Current High Altitude Debris-Air Coupling Mechanisms" by C. R. Shonk, J-10 and D. W. Forslund, T-12

"The Debris Loss Cone" by J. Zinn, J-10

"Experimental Data and Theory. The Challenge of Starfish Auroral Phenomena" by H. Hoerlin, J-10

"Large Scale Numerical Simulation of High Altitude Nuclear Bursts at Early Time" by R. L. Morse, P-18 and C. R. Shonk, J-10

Presentation at Michigan State University, East Lansing, Dec. 22:

"Physics Experiments with Nuclear Explosions" by G. J. Berzins, J-12

Presentation at Michigan State University, East Lansing, Dec. 30:

"Deformed Nuclei Near Z=50?" by G. J. Berzins, J-12

Presentation at seminars at Case Western Reserve University, Cleveland, Ohio, Jan. 6 and Aberdeen Proving Ground, Nuclear Effects Laboratory, Edgewood, Md., Jan 7:

"Fast Neutron Scattering from Liquid Tritium and Helium-4" by A. Niiler, P-DOR

Presentation at Symposium on Research on Uranium Plasmas and Their Technological Applications, Gainesville, Fla., Jan. 7-8:

"Current Status of the Analysis of the Optical Spectra of Uranium" by D. W. Steinhaus, L. J. Radziemski, both CMB-1 and R. D. Cowan, T-DOT

Presentation at Duke University, Physics Department, Durham, N.C., Jan. 8:

"Polarized Neutrons from an Underground Nuclear Explosion" by G. A. Keyworth, P-3

Presentation at meeting of the Atlanta Chapter of the Health Physics Society, Atlanta, Ga., Jan. 14 and at meeting of the Savannah River Chapter of the Health Physics Society, Augusta, Ga., Jan. 15:

"Biomedical Aspects of Pi Negative Mesons" by W. H. Langham, H-4 (invited)

Presentation at International Systems Sciences Conference, Honolulu, Hawaii, Jan. 14-16:

"Spectral Effects in the Use of Higher-Ordered Approximation for Computing Discrete Fourier Transforms" by B. R. Hunt, C-5

Presentation at the American Nuclear Society Symposium on Engineering with Nuclear Explosives, Las Vegas, Nevada, Jan. 14-16:

"Symmetry of Neutron-Induced ^{235}U Fission at Individual Resonances. III" by R. J. Prestwood, Barbara P. Bayhurst, J. S. Gilmore, G. W. Knobeloch, and G. A. Cowan, all J-11

"The Present Status of Scientific Applications of Nuclear Explosions" by G. A. Cowan, J-11 and B. C. Diven, P-3

"Use of Nuclear Explosives in Measurement of Nuclear Properties of Fissile Materials" by B. C. Diven, P-3

"Elastic Neutron Interaction Measurements With a Moderated Bomb Source Spectrum" by M. M. Hoffman, J-12

Presentation at seminar at Virginia Polytechnic Institute, Blacksburg, Va., Jan. 16:

"Computer Fluid Dynamics" by W. E. Pracht, T-3 (invited)

Presentation at the University of Tennessee Space Institute, Tullahoma, Tenn., Jan. 16:

"Two-Phase Flow and Low Temperature Heat Transfer" by K. D. Williamson, Jr., CMF-9

Presentation at Eighth Aerospace Sciences Meeting of the American Institute of Aeronautics and Astronautics, New York City, Jan. 19-21:

"Turbulence Transport Equations and Their Numerical Solution" by P. I. Nakayama, T-3 (invited)

Presentation at the International Symposium on Atomic, Molecular and Solid State Theory, Sanibel Island, Fla., Jan. 19-24:

"Current Work on $X_{Alpha, Beta}$ Method for Solids" by A. M. Boring, CMF-5 "Exchange Holes in Atoms" by A. M. Boring, CMF-5

Presentation at Inter-Agency Mechanical Operations Group Joining Sub-group Meeting at G. E. Pinellas Neutron Devices Department, St. Petersburg, Fla., Jan. 20-22:

"Welding of TZM Molybdenum Alloy" by G. S. Hanks, CMB-6

"The Relationship of Beam Spot Size to Weld Geometry in Electron Beam Welding" by D. J. Sandstrom, CMB-6

Presentation at American Mathematical Society Annual Meeting, San Antonio, Texas, Jan. 22:

"Equal Weight Quadrature on Half-Infinite Intervals" by D. K. Kahaner, C-6

Presentation at colloquium, University of Oregon, Eugene, Jan. 22:

"The Los Alamos Meson Physics Facility; Accelerator Design, Experimental Facilities, and Experimental Program" by E. A. Knapp, MP-3 (invited)

Presentation at the Annual Meeting of the American Physical Society, Chicago, Ill., Jan. 26-29:

"Numerical Simulation of Anomalous Resistivity in Plasma" by C. W. Nielson, P-18 (invited)

"Molecular Beam Kinetics: The Differential Cross Section of the Reaction Cl + Br_2" by N. C. Blais and J. B. Cross, both CMF-4

"Convergence Difficulties in the Solution of the Hartree-Fock Equations for Excited D and F Electrons" by R. D. Cowan and D. C. Griffin, both T-DOT

"Accurate Cross-Sections for $^3H(p, p)^3H$, $^3H(p, d)^2H$, and $^3H(p, ^3He)n$." by J. L. Detch, Jr., N. Jarmie, both P-DOR and R. L. Hutson, MP-DOT

"Elastic Scattering of Protons and Electrons from Helium Atoms in the Glauber Approximation" by J. D. Johnson and J. E. Brolley both P-DOR

Presentation at American Society of Civil Engineers Water Resources Meeting, Structural Session on Nuclear Applications, Memphis, Tenn., Jan. 28:

"Shielding Requirements for a Linear Accelerator" by P. R. Franke, Jr., MP-6 and M. D. Keller, ENG-1

Presentation at Astrophysics Colloquium at the University of Chicago, Ill., Jan. 28:

"Solar Wind Chemical Composition" by A. J. Hundhausen, T-2 (invited)

Presentation at seminar at Wright State University, Department of Biology, Dayton, Ohio, Jan. 29:

"Repair of Ultraviolet Light- Damaged DNA in Haemophilus Influenzae" by G. J. Kantor, H-4 (invited)

Presentation at Space Science Colloquium, Rice University, Houston, Texas, January 29:

"Interplanetary Shock Waves" by A. J. Hundhausen, T-12 (invited)

new hires

C division

John G. Salazar, Espanola, C-1

CMB division

David W. Carroll, Los Alamos, CMB-6
James T. Frakes, Cheswick, Pa., CMB-6
Gerald L. Robertson, Hobbs, CMB-8

CMF division

Basil I. Swanson, Torrance, Calif., CMF-4

D division

Louis G. Gibney, Jr., Albuquerque, D-6

GMX division

Mary E. Griego, Los Alamos, GMX-4

H division

John A. Steinkamp, Ames, Iowa, H-4

Mail and Records

Nancy M. Smith, Los Alamos
Zelda R. Wade, Los Alamos

MP division

Laura J. Shroffler, Los Alamos, MP-DO
Richard C. Bagley, Los Alamos, MP-1
Justo F. Cordova, Los Alamos, MP-3
Jose P. Ortega, Santa Cruz, MP-3
Michael A. Paciotti, Berkeley, Calif., MP-3
Daniel A. Sandoval, Santa Fe, MP-3
John N. Leavitt, Upton, N.Y., MP-4
Lawrence K. Davis, Los Alamos, MP-6

N division

Hugh D. Murphy, Cleveland, Ohio, N-7
Raymond I. Olivas, Los Alamos, N-7

Personnel department

Nancy C. Worth, Los Alamos, PER-1
Pamela J. Royer, Los Alamos, PER-4

P division

Juan O. Velasquez, Las Cruces, P-15
Garrett A. Barnes, Santa Fe, P-16

Shop department

David J. Salazar, Los Angeles, Calif., SD-1
Franklin H. Seurer, Fond du Lac, Wisc., SD-1

Supply and Property department

Morris J. Santistevan, San Juan Pueblo, SP-4
Judy B. Marriott, Los Alamos, SP-11
Fannie P. Benavidez, Truchas, SP-12
Monica H. Fink, Los Alamos, SP-12
Marjorie A. Nagy, Los Alamos, SP-12

W division

Patrica A. Tyler, Santa Fe, W-1
Robert Milkey, Bloomington, Ind., W-7
Fabian O. Martinez, Hawthorne, Calif., W-8

20 years ago in los alamos

Culled from the March, 1950, files of the Los Alamos News by Robert Porton

Signboards Blacklisted on the Hill

The Traffic Board announced that signboards would not be permitted along streets and roads, except those required for traffic direction and to control access to restricted areas. The Board stated that those already erected must be removed. AEC officials commented that public opinion is in agreement with the decision.

School System Transferred

Transfer of the Los Alamos and White Rock schools from the AEC to the Los Alamos County Board of Education was completed with the signing of an agreement covering maintenance and operation. Signers were Carroll L. Tyler, manager of the Santa Fe Operations Office, and Norris E. Bradbury, director of the Los Alamos Scientific Laboratory and president of the Board of Education. It covers such phases as the Commission's continuing contributions in funds, use of the physical plant for non-school purposes and operation of the Civic Auditorium, gymnasium and community swimming pool. It recognizes that the Board will have "complete freedom with respect to application of academic policies and procedures as prescribed by the State of New Mexico".

Golf Association and AEC Negotiate Contract

A newly-formed Los Alamos Golf Association is concluding negotiations with the Atomic Energy Commission to manage the local 18-hole golf course and club. Mike Clancy has been elected president of the new group. The first golf course in Los Alamos was built by soldiers during the war in a pasture which is now the Western Area residential district. In 1947 a nine-hole course was opened on North Mesa. In July of 1949 a second nine was added. Considered one of New Mexico's finest lay-outs, it has been operated by the government as a community facility. Under the contract now being negotiated, the AEC will supply the course, buildings and present equipment. The new Golf Association will finance and operate the club and course.

Physics Fellowship Program Announced

A new fellowship program to give training in radiological physics to selected college graduates with degrees in basic science or engineering will be sponsored by the Atomic Energy Commission for the academic year 1950-51. The program is accredited for graduate-level training leading toward an advanced degree.

what's doing

PUBLIC SWIMMING: High School Pool—Mondays-Thursdays, 7:30 to 9 p.m.; Saturdays, 1 to 6 p.m.; Adult Swim Club, Sundays, 7 to 9 p.m.

MESA PUBLIC LIBRARY: Feb. 24-March 31—watercolor and oil paintings by Edith King;
Feb. 25-March 18—displays by Campfire Girls and Girl Scouts;
March 19-April 8—Ukrainian exhibit by Mrs. Stephanie Sydoriak

RIO GRANDE RIVER RUNNERS; Meetings scheduled for noon, second Tuesday of each month at South Mesa Cafeteria. For information call Cecil Carnes, 672-3539.

SIERRA CLUB: Luncheon meeting at noon, first Tuesday of each month, South Mesa Cafeteria. For information call Brant Calkin, 455-2468, Santa Fe.

LOS ALAMOS SKI CLUB: Pajarito Mountain, tow runs from 9 a.m. to 4 p.m., week-ends and holidays. Rental equipment available. Ski School schedule—Group lessons, 6 to 12 students, 1½ hours, 10:30 a.m. and 1:30 p.m.; Semi-private lessons, up to 3 students, 1 hour, 10:30 a.m., noon, and 1:30 p.m.; Young children's class, kindergarten and up, 6 to 12 students, 12:15 p.m.

MOUNTAIN MIXERS SQUARE DANCE CLUB: For further information call Mrs. Alice Wynne, 2-5964.
March 7—Bill Wright, Farmington, caller, 8 to 11 p.m., Canyon School.
March 21—Bones Craig, caller, 8 to 11 p.m., Canyon Cchool.
Round dance lessons will begin the last week in February.

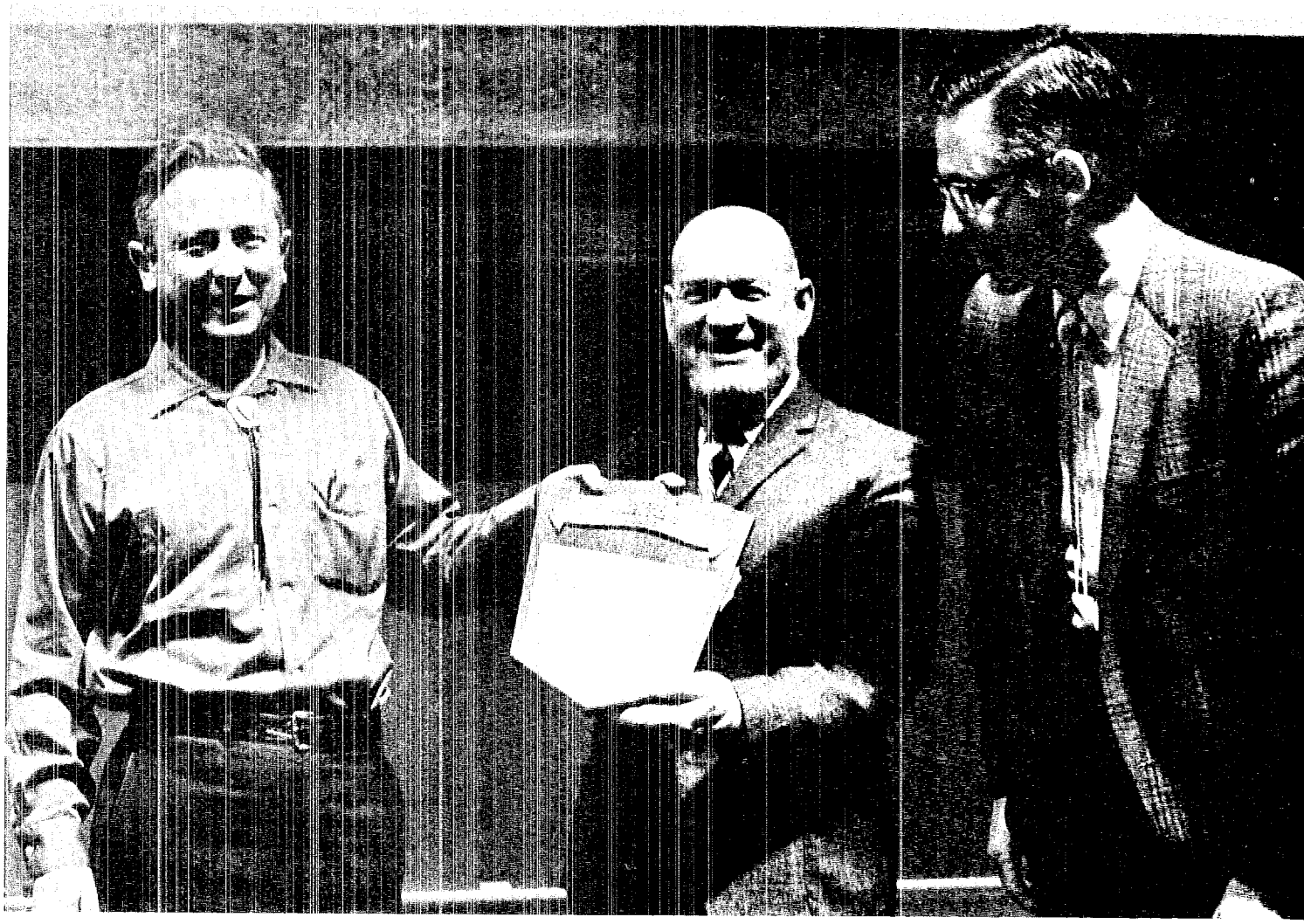
LOS ALAMOS ARTS COUNCIL: March 8—general meeting, 7:30 p.m. Members of the International Folkdancers will present a program of Scandanavian and Balkin dances.
Date to be announced—Drama reading of Samuel Beckett's one-act play "Krapp's Last Tape."
All Arts Council events take place in Fuller's Lodge.

OUTDOOR ASSOCIATION: No charge, open to the public. Contact leader for information regarding specific hikes.
March 1—Camp May to Guaje Canyon —Bob Goldman, 2-6594
March 10—meeting—7:30 p.m., Bob Goldman, 2346-A 35th Street, 2-6594
March 15—Santa Fe Ski Basin to Cowles —Ken Ewing, 8-4488

LASL TOASTMASTERS CLUB: Speechcraft classes begin March 30, South Mesa Cafeteria, noon to 1 p.m. Course on fundamentals and practice of public speaking emphasizing how to organize, prepare and present a speech, conduct meetings and work on committees. For information call C. Mills, 7-4763.

LOS ALAMOS FILM SOCIETY: March 25—"The Shop on Main Street"—Civic Auditorium—7:30 p.m. Memberships available at Decol's or write P.O. Box 7 for details.

NEWCOMERS CLUB: Wednesday, March 18—couples pot-luck dinner, 6:30 p.m., Recreation Hall. For information call Judy Ware, 2-5745.



MP division personnel have worked their first million man hours and have done so without a lost time accident. For the latter achievement, the division received the Safety Achievement Award shown being presented to Division Leader Louis Rosen, left. Roy Reider, H-3 group leader, center, presented the award to Rosen on behalf of the Los Alamos Scientific Laboratory at one of the division's regular safety meetings. At right is Thomas Putnam, MP-1 group leader and division safety officer.

Henry T. Motz
3187 Woodland
Los Alamos, New Mexico 87544

The Los Alamos Scientific Laboratory has one of the most powerful computer centers in the world. And the capability of its Central Computing Facility was increased last month with the addition of a Control Data Corporation 7600 computer system—one of the fastest in the world. A second 7600 is scheduled to be delivered in June. The Laboratory's computers are in use 24 hours a day processing data and solving problems in all areas of LASL's research programs and projects.